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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/600,654	Applicant(s) SONG ET AL.	
	Examiner Yubin Hung	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-19, 29-38 and 48-58 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 6, 7, 20, 21, 23, 25, 26, 39, 40, 42, 44 and 45 is/are rejected.
- 7) ☒ Claim(s) 3, 5, 8, 9, 22, 24, 27, 28, 41, 43, 46 and 47 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 April 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment/Arguments

1. This action is in response to amendment filed 04/12/07, which has been entered.
2. Claims 1-58 are still pending.
3. In view of Applicant's amendment, the objection to the drawings has been withdrawn.
4. In view of Applicant's amendment, the objection to the specification has been withdrawn.
5. In view of Applicant's amendment, the 35 USC § 112 rejections of claims 10-19 and 48-57 have been withdrawn. [Note that with the change of dependency made to claims 19 and 57, the antecedent basis for "the calculated threshold" now exists (in their respective parent claims 13 and 51) and there is no need to change "the calculated threshold" to "a calculated threshold." Note further that while Applicant states that claim 24 has been amended to depend from claim 23, the actual amendment has not been made.]

6. In view of Applicant's amendment, claims 10-19 and 48-57 have been allowed since the 35 USC 112, second paragraph objection to claims 10 and 48 have been overcome.

7. Applicant's arguments filed 07/02/04 have been fully considered but they are not persuasive; see below.

8. **In remarks Applicant argued in substance:**

Regarding claims 1, 20 and 39

A. *that Tan calculates the time of the completion of the decoding while the claimed invention uses the amount of decoding performed on previous image data which is received from a decoder (P. 16, last paragraph) and that Boyce does not disclose using the decoder complexity information representing an amount of decoding computation performed on previous images received from a decoder (P. 17, 1st paragraph)*

However, Tan actually discloses calculating the time it takes to complete the decoding (i.e., the amount of decoding) of a previous image and feeding the information back to the encoder [Fig. 12, refs. 301 and 302; Col. 9, lines 18-20, 26-27 and 38-42] to encode the current image. While ref. 302 is a simulator of the decoder, Boyce was relied upon in the rejection to teach using information

fed back from a decoder (e.g., the amount of decoding computation as taught by Tan) to control compression. (Boyce was not relied upon to teach that the complexity information represents an amount of decoding computation.) Therefore the argument is not persuasive.

- B. *that (with respect to the APA) the decoder cannot properly encode (sic) the received bit stream or make full use of the allocated computation amount; that a fixed, predetermined threshold value is used; and that the varying complexity of DCT computation from block to block is not considered (P. 17, 1st paragraph)*

However, as per the analysis of claims 1, 20 and 39, the APA is modified by the teachings of Boyce and Tan specifically to overcome the deficiencies recited above by feeding back decoding complexity (in terms of the amount of encoding) to the encoder to control the skipping of DCT operations on the current image, in addition to using the sum of absolute difference (SAD) and the quantization coefficient (Q) [Fig. 2, refs. 210, 220, 270, 280 and paragraphs 6, 12 and 13 of the instance invention]. Therefore the argument is not persuasive.

Claim Rejections - 35 USC § 103

(From Office action mailed 01/12/07)

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 2, 4, 6, 7, 20, 21, 23, 25, 26, 39, 40, 42, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over APA (Admitted Prior Art of Fig. 2 and paragraphs 12 & 13 on page 2 of the instance application), and further in view of Boyce et al. (US 5,825,927) and Tan et al. (US 6,542,549).

11. Regarding claim 1, and similarly claim 39, APA discloses a method for controlling the DCT computation amount that

- receiving *complexity information* on previous image data [Fig. 2, refs. 220, 270 & 280 (receiving complexity information from 220 & 270); P. 2, paragraph 13, lines 1-4. Note that the outputs from 220 and 270 constitute complexity information]
- controlling a skipping of DCT operations on current image data based on the received *complexity information* [Fig. 2, refs. 210 & 280; P. 2, paragraph 13]

APA does not expressly disclose that the complexity information is decoder complexity information that represents an amount of decoding computation performed on previous image data.

However, Boyce discloses using information feedback from a decoder as a control signal for the compression circuit [Fig. 7, refs. 701 (decoder) & 712 (compression circuit); Col. 6, lines 27-29 & 39-46. Note that skipping DCT computation as disclosed in APA is a form of compression control.]

In addition, Tan discloses using the amount of decoding computation performed on previous image data as feedback information. [For the feeding-back, see Fig. 12, refs. 301 & 302 (feeding back complexity information from VCV 302 to encoder 301), as well as Fig. 18, refs. 601 (Macroblock Type Decision), 611 & 612 (showing VCV 612 feeding back complexity information that controls Macroblock Type Decision at 601) and Col. 11, lines 8-13. Note that Col. 9, lines 9-42, especially 18-20, 26-27 and 38-42, describe how VCV determines the amount of decoding computation complexity (as performed on previous image data, see lines 28-34). Note further that Fig. 8, ref. 804 (Virtual Decoder Model) shows that the VCV models the decoder (see also Col. 9, lines 15-17). Note further still that Fig. 2, ref. 201 (Macroblock Type Decision) and Col. 2, lines 1-4 describe how Macroblock Type Decision (also shown in Fig. 18 as ref. 601) controls macroblock encoding decisions, of which skipping the DCT operation, as disclosed in the APA, can certainly be one.]

APA, Boyce and Tan are combinable because they all have aspects that are from the same field of endeavor of encoding.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify APA with the teachings of Boyce and Tan by using the decoding computation complexity information fed back from the decoder to control the encoding process (such as skipping DCT computation). The motivation would have been to allow the decoder to deal with unpredictable worst-case encoded bitstream (as indicated by Boyce in Col. 6, lines 48-51), as well as to accurately constraint the resource requirement in the decoder (as Tan indicates in Col. 3, lines 30-34 & 40-52).

Therefore it would have been obvious to combine Boyce and Tan with APA to obtain the invention as specified in claim 1.

12. Regarding claim 20, note that APA further discloses a DCT computation amount controller [Fig. 2, ref. 280] which, as modified by the teachings of Boyce and Tan as set forth above will control skipping of DCT operations using decoder computational complexity [per the analysis of claim 1]; Fig. 2, ref. 210 and P. 2, paragraph 13 further discloses a DCT unit under the control of the controller. Therefore claim 20 is obvious and is accordingly rejected.

13. Regarding claim 2, and similarly claims 21 and 40, Tan further discloses

- wherein the receiving decoder complexity information further comprises calculating the decoder complexity information which represents the amount of decoding computation performed on previous image data [Fig. 12, ref. 302 (feeding back complexity information to encoder 301) and Col. 9, lines 9-42, especially 18-20, 26-27 and 38-42, which describe how VCV calculates the amount of decoding computation complexity, as performed on previous image data (see lines 28-34)].

Note further that Fig. 8, ref. 804 (Virtual Decoder Model) shows that the VCV models the decoder; see also Fig. 12, ref. 305 and Col. 9, lines 15-17.]

14. Regarding claim 4, and similarly claims 23 and 42, Tan further discloses

- wherein the decoder complexity information includes information on a decoder computation amount allowed for the previous image data [Col. 11, lines 9-12. Note that the defined bound against the complexity is checked is considered the allowed decoder computation complexity]
- information on a decoder computation amount actually consumed for the previous image data [Per the analysis of claim 1. Note that as set forth in that analysis, the combined invention of APA, Boyce and Tan discloses a method in which the actual decoder information for the previous image data is provided to the encoder (as taught by Boyce in Fig. 7, refs. 701 & 712 and Col. 6, lines 27-29 & 39-46) and, as taught by Tan (Col. 9, lines 9-42, especially 18-20, 26-27 and 38-42), the feedback information is the decoder complexity representing computation amount]

15. Regarding claim 6, and similarly claims 25 and 44, Tan further discloses

- wherein the previous image data are a predetermined number of previous frames, and the current image data is a frame being currently encoded [Col. 9, lines 28-34 (i.e., the number of previous pictures to be decoded, or the size of the previous image data, is one); Col. 11, lines 9-12 (since the decision is made on a per-macroblock basis, the current image data is the frame that contains the macroblock being encoded (therefore the frame per se is being encoded))]

16. Regarding claim 7, and similarly claims 26 and 45, APA further discloses

- wherein a DCT operation on the current image data is executed or skipped in the currently-encoded frame on a block-by-block basis [Fig. 2, ref. 210; P. 2, paragraph 13, lines 3-4]

Allowable Subject Matter

17. Claims 10-19, 29-38 and 48-58 are allowed.

18. Claims 3, 5, 8, 9, 22, 24, 27, 28, 41, 43, 46 and 47 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. The following is a statement of reasons for the indication of allowable subject matter:

A. Regarding claim 3, and similarly claims 22 and 41, the combined invention of APA, Boyce and Tan discloses all limitations of its parent, claim 1. APA further discloses calculating a threshold value and using it to control the skipping of DCT operations [Fig. 2, ref. 280 and P. 2, paragraph 13, lines 1-4]. Tan further discloses comparing the complexity with a defined bound (i.e., threshold) to make encoding decision [Col. 11, lines 9-13]. Lin et al. (US 6,748,019) also discloses using a threshold to determine whether DCT operations should be skipped [Fig. 3; Col. 2, lines 30-34]. However, none of the recited references, alone or in combination, disclose, teach or suggest calculating a target DCT computation amount for the current image data using

the received decoder complexity information and using it to calculate the threshold for DCT skipping decision.

B. Regarding claim 5, and similarly claims 24 and 43, closest art of record APA, Boyce, Tan and Lin, alone or in combination, do not disclose, teach or suggest including the ratio recited in the claim as part of the decoder complexity information.

C. Regarding claim 10, and similarly claims 29, 48 and 58, per the analysis of claim 1, the combined invention of APA, Boyce and Tan discloses the limitations regarding the receiving of decoder complexity information for DCT skipping control. APA further discloses the use of SAD (which is not a variation of the motion estimator (ME) computation amount) in the DCT skipping control [Fig. 2, refs. 270 & 280; P. 2, paragraph 13].

In addition, Gonzales et al. (US 5,231,484) discloses using the outputs from the ME for rate control [Fig. 11, refs. 14 & 15; Col. 15, line 39-Col. 20, line 36]; Elbaz et al. (US 6,757,005) discloses using the motion vectors and their associate quality factor to decide whether the encoding of a macroblock should be skipped [Fig. 4, refs. 180, 410, 420, 450 & 460; Col. 8, lines 13-41]; and Kim et al. (US 2002/0118746) discloses using sum of absolute difference (SAD) from the ME for rate control [P. 2, equation 1 and paragraphs 21, 22 & 25].

However, none of the references cited above, alone or in combination, disclose, teach or suggest using ME computation amount variation information in determining whether to skip DCT operations on current image data.

Conclusion and Contact Information

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella

can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Patent Examiner
Art Unit 2624

July 2, 2007



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